section); *g*, umonbal muscle (a horizontal section); *u*, setal band; *w*, outer edge of setal band; *x*, setæ.

Fig. 5. Cardinal region of pedicle-valve. a, deltidium; b, deltidial ridges; b′, deltidial callosities, slightly developed; c, areal spaces; d′, lineated impression, produced by anterior end of corneous layer of pedicle (see fig. 3, d); e, lobe-scars produced by tendinous lobes of corneous layer of pedicle; h, cross section of muscular or inner layer at root of pedicle; i, central hollow of pedicle: *b*, posterior parietal; *g*, umbonal muscle; *u*, setal band, which has its outer edge (*w*) effected to show the parts d, h, i (the corneous layer is removed to show the lineated impression made by the anterior end of its lower division—see fig. 3, d, g).

II.—*On two new Species of* Gummineæ, *with Special and General Observations.* By H. J. Carter, F.R.S. &c.

[Plate I.]

In a glass jar bearing the inscription "H.M.S. 'Porcupine,' No. 3*a*, lat. 48° 31′ N., and long. 10° 03′ W., depth 500 faths., and muddy bottom," which must have been just outside the so-called "chops" of the English Channel, is an oblong specimen about $2\frac{1}{2} \times 1\frac{1}{4} \times \frac{3}{4}$ inch, consisting of a mass of dead *Lophohelia prolifera*, over which has grown a *Farrea*, which, having shared the same fate, had become partially infested, both inside and out, with three other sponges bearing spicules which indicate that they belong respectively to *Dictyocylindrus*, Bk., *Desmacella*, Sdt., and *Reniera*, Sdt., together with a *Cliona* whose habitat was inside the stems of the *Lophohelia* and its fenestral openings on the surface of the latter, all of which have finally become enveloped in a *Gummina*, whose fleshy substance now forms the greater part of the mass (Pl. I. figs. 1 & 2).

With the exception of the *Lophohelia* and *Farrea*, all appear to be new species.

As the three infesting sponges are merely parasitic growths of small dimensions and without definite form, I shall only be able to characterize them by their complements of spicules respectively. The *Cliona*, too, having lived in the interior of the *Lophohelia*, necessitates a similar description, while the *Gummina*, which, as before stated, forms the greater part of the mass, claims our first and chief consideration.

It is with great pleasure that I embrace this opportunity of calling attention to a class of sponges which has been very little studied, especially in England; and having found in the British Museum, through the aid of Dr. Gray, another species, which came from Port Jackson in New South Wales, I shall thus be able to give the results of my examination of this as well as the

deep-sea one, together with observations on the Gummineæ generally.

For the deep-sea specimen I would propose the name of "*Corticium abyssi*," and for the one from Port Jackson "*Chondrilla australiensis*," giving my reasons for adopting these names hereafter.

Corticium abyssi, n. sp. (Pl. I. figs. 1–9 & 15.)

Repent, amorphous, assuming more or less the form of the object or cavity in which it may be growing. Smooth, slippery, of a light greyish-yellow colour; semiclastic, subcartilaginous, solid. Tearing when wet like hard-boiled white of egg, but much tougher; brittle when dry, and breaking like glass. Spiculiferous, but not fibrous in the sense of spongologists—that is, without fibrous skeleton. Aspect homogeneous, massive, puckered here and there on the surface towards fixed points as if from contraction or forcible extension. Vents numerous, small, of different sizes, congregated here and there irregularly (figs. 1 & 2, *c*). Pores microscopic, linear, more or less uniformly spread over the surface (fig. 9, *b*). Internal structure fleshy, solid, composed of an opaque mass or body of ovoid cells, surrounded by a thin, translucent cortical rind; permeated throughout by branched systems of excretory canals, respectively terminating in the vents mentioned, and charged with siliceous spicules most numerous at the circumference. *Microscopic structure*: Surface consisting of a thin, tough, transparent cuticula, composed of parallel fibres, supported on the points of spicules, in the intervals between which are the pores; covering the cortical substance beneath, which consists of a layer of spicules imbedded in a kind of trama composed of fine fibres and minute granuliferous cells. Trama of the cortex soon rendered opaque by the presence of the body of ovoid cells, to which it affords respectively separate cavities of a similar shape throughout the mass. Ovoid cell about 5-6000ths inch long, filled with granules, in which there appears sometimes to be a faint trace of a nuclear body; maintaining its form when out of its cavity, but presenting no appearance of cell-wall (fig. 8, *a*). Surface of the excretory canals covered with an epithelium of small conical cells, whose free ends, projecting above the level of the canal, form, in juxtaposition, a remarkably rough granular pavement, which appears to be not less common to the mouths of the pores and their canals than to the excretory system generally (figs. 15 & 9, *b*). Mode of termination inwards of the pore-canals and commencement of the excretory ones not observed. Spicules of two kinds, viz. bi-

ternate and birotulate; the former moderately large, and the latter extremely minute. The biternate spicule consists of a straight shaft and three arms given off at the union of the two upper fourths of the former (fig. 3); shaft obtusely pointed above (fig. 4, *a*), and finely pointed below (fig. 4, *c*); inflated in the centre, and covered throughout with short, conical, vertical spines, except between the inflation and the arms, where it is smooth like the first part of the latter (fig. 4, *b*). Arms three in number, parting from the shaft at equal distances from each other, and dividing respectively into three secondary arms, all of which are on the same plane and nearly perpendicular to the shaft; secondary arms obtusely pointed and covered throughout with short, vertical, conical spines (fig. 5, *a*, *b*). Central canal evident in every part (fig. 4, *d*), showing that the original design of the spicule was biternate, which is confirmed by the smaller or younger forms being of the same kind, but without spines, and the central inflation consequently more evident (fig. 6, *a*). Birotulate spicules extremely minute, consisting of a straight shaft and four recurved arms at each end (figs. 7 & 8, *b*). *Distribution*: The biternate spicule, besides being plentifully scattered throughout the mass, is particularly congregated towards the surface, where it forms a layer with the arms horizontal, and the obtuse ends of the shafts, as before stated, supporting the cuticula. The birotulate spicule, on the other hand, although equally scattered through the mass, appears to be congregated most about the surface of the excretory canals, whose course can be thus traced by this accumulation in specimens which have been dried under compression and afterwards mounted in Canada balsam. *Measurement*: Shaft of the biternate spicule 14-6000ths inch long; diameter of the head or arms 13-6000ths. Shaft of birotulate spicule 1-5000th inch long; other parts too minute for measurement. Size of specimen, that of the mass of dead *Lophohelia* over which the *Corticium* has grown.

Hab. Marine, growing over various objects, imbedded or not in deep-sea mud, as the case may be.

Loc. Western entrance of the English Channel, about 48° 31′ N. lat., and 10° 03′ W. long., in 500 fathoms.

Obs. As the spicules of this *Gummina* come nearest to those of *Corticium candelabrum*, Sdt. (Die Spong. adriat. Meeres, p. 42, Taf. iii. f. 25) and *C. plicatum* (Die Spong. Küste Algier. p. 2, Taf. iii. f. 11), I have given it this generic name, with a deep-sea designation. It occurs in the specimen mentioned, and on a large piece of *Pachastrella abyssi*, Sdt. (also dredged up by the 'Porcupine'), over part of which it has dragged itself, enveloping every thing in its course like an *Æthalium*. While

fresh or in spirit it has much the appearance of wet chamois-leather; and although not more than half as tough (for it can be easily torn), it is so soft and resilient that it will receive the impression of the nail, and efface the same of its own accord. After it has been dried, however, it becomes hard like glue, and breaks with a similar fracture; while, wet or dry, its aspect is so homogeneous, that at first sight one would hardly conceive it to possess all the structures above mentioned.

The pores, the vents, and branched systems of excretory canals, together with the siliceous spicules, all point to its intimate connexion with the sponges; while the entire absence of the so-called sponge-fibre-structure, and the presence of the ovoid cell (fig. 8, *a*), which makes up the greater part of the body-mass, together with the remarkably granulated form of the epithelial layer of cellules on the surface of the excretory canals (fig. 15, *a*), are equally characteristic of the Gummineæ.

By the so-called "sponge-fibre-structure" I mean the skeleton of sponges, *par excellence*, which is horny in many, and composed of spicules united together into a fibrous structure by amorphous sarcode in others. "Fibre" is a bad name for this structure; for, besides being inappropriate, there is *real* fibre (that is, minute linear filament) to be seen in many soft parts of sponges, which has nothing to do with the skeleton whatever. Thus, although in the Gummineæ, there is no "sponge-skeleton-fibre" so to speak, the cuticula and a great part of the body is made up of fine, intercrossing filaments, which are so soft that, on drying, they all sink their form into a common homogeneous mass, like hard glue.

Nothing can be more unlike sponges in general than the slippery, resilient, amorphous, rounded, sublobed, flat, incrusting, homogeneous-looking mass presented by the Gummineæ; while, perhaps, a piece of wet dough resembles them most.

Although the vents appear to retain their circular form, the pores are more like crevices—that is, linear, and sometimes triangular like the form of a leech-bite (fig. 13), not circular, as they are in the true sponges. This may be owing to the structural lining of the pore, which, together with that of the excretory canals, as before stated, in the Gummineæ consists of a rough, granulated layer, each granule of which is a separate cellule (fig. 9, *b*) (probably flagellate in the living state); while in the true sponges the pore is circular and smooth, as if always surrounded by a homogeneous layer of sarcode. If there be similar cells in the latter during life, they subside into the form of a homogeneous sarcode after death, and thus become indistinguishable; while in the Gummineæ they remain, indicative of a higher state of development—that is, a state in which the his-

tological element maintains its living form instead of relapsing after death into a common homogeneous mass. In the true sponges the softer histological elements, such as fibre-filament, cells, &c., hardly do more than *loom*, as it were, in the scale of development, vanishing with death into homogeneity; while in the higher developments they become permanent—*e. g.*, the histological elements in the human subject. Homogeneity of appearance, as in the intercellular sarcode of sponges, is no proof whatever of the absence of histological structure. There is structure in glass, as I have often said before; but this cannot be demonstrated.

It is possible that the pores may be continuous, through tubular prolongations, with the excretory canals, as in the following species; but although invisible here (probably on account of the thick surface-layer of spicules in the cortex), there can be little doubt that the increasing size of the branches of the latter, as they join one another to form a common trunk, indicates, as in the true sponges, a current *inwards* through the pores, and *outward* through the oscula.

The ovoid cells (fig. 8, *a*), which are only half the size of those in the following species, have been called "embryos" by Schmidt (Spong. adriat. Meeres, p. 42); and Kölliker has used the same name after him, although evidently not satisfied of their true import (Icones Histologicæ, "Feinere Bau der Protozoen," p. 68, with excellent illustrations, Taf. viii. f. 18, and Taf. ix. f. 10 & 11); but if they be the "embryos," where are we to look for the *adult* forms?—since, throughout every part of *Corticium abyssi*, as well as in the following species, viz. *Chondrilla australiensis*, respectively, they are all alike.

It is also possible that ova may be present, and that I have overlooked them, as they have been seen in *Corticium candelabrum* by Kölliker, and figured (*op. cit.* Taf. viii. fig. 3); but no one could confound the "ovoid cell" with an ovum, inasmuch as the globular form of the latter, with evident nucleus and nucleolus, must contrast strongly with the conoid form of the ovoid cell filled with granules, in which a nucleus is only now and then faintly visible. I must, then, for the present, look upon these ovoid cells of the Gummineæ as analogous to the spheroidal groups of flagellated cells in the fibrous sponges, reserving all further description of them in this respect until I shall have observed and experimented on them in the living state, as I have heretofore done on the true sponges. To show that the cells which line the surface of the excretory or water-canal (*Wimper-Apparat* of Lieberkühn), or those of the ampullaceous sac (*Wimperkorb* of Schmidt), are flagellated is not

sufficient: we want to know if they take in crude material for food, like those of the other sponges. *This* is what I claim to have shown in 1857 in *Spongilla* (Annals, vol. xx.), and repeated in 1871 in *Grantia compressa* (*ib.* vol. viii.).

The birotulate of *Corticium abyssi* is the smallest spicule that I have met with. Even under 1-40th-inch focus, which Mr. Powell, junior, kindly put upon it for me, I could hardly distinguish its form, and then not so distinctly as with one of his $\frac{1}{8}$ immersion object-glasses. (So much for the *definition* of the higher powers!) To see this spicule, even tolerably satisfactorily too, with a $\frac{1}{8}$, it is necessary to boil a piece of the *Corticium* in nitric acid, and, after a convenient amount of dilution with water, to place a little of the fluid containing the spicules under a glass cover, when, by the vibration of the spicule causing it to turn over and over, the arms may now and then be distinguished, and the shaft appear to be microspined about the centre. This must be done at once, as the accumulation of organic matter about the spicules, after a few hours' interval, entirely defeats the object.

One of the most interesting points elucidated by the examination of this deep-sea specimen is the fact that the *Corticium* has enveloped the remains of a *Farrea*, and that the *Corticium* possesses similar "biternate" spicules to those figured by Dr. Bowerbank as the "retentive spicules" of his *Farrea occa* (Proc. Zool. Soc. Lond., May 1869, pl. xxiv. figs. 2–6).

Were it not evident that a "biternate" spicule can never form part of a Hexactinellid sponge, the fact of such spicules having not only been figured in connexion with *Farrea occa*, but also with *Dactylocalyx pumiceus* and *Iphiteon panicea* (Proceed. Zool. Soc., Jan. 1869, pl. iii. fig. 16, and May *ib.* pl. xxii. fig. 11), would cast a doubt over their real parentage.

Taken, however, in connexion with the fact that Dr. Bowerbank's specimens of *Farrea occa* were obtained from the detrital mass supporting *Euplectella cucumer*, Owen (Trans. Linn. Soc. vol. xxii. pl. xxi.), it seems not unlikely that they were there also accompanied by a *Gummina*, as in our deep-sea specimen, but of a form, as may be seen by the spicules figured by Dr. Bowerbank, still more nearly approaching those of Schmidt's *Corticium candelabrum* (*op. cit.* Taf. iii. fig. 25, *a*, *g*) than those of *Corticium abyssi*.

The fragments of *Farrea* enveloped by *Corticium abyssi* in the deep-sea specimen (fig. 2, *d d*) will form the subject of my next communication, in which I shall endeavour to show what the loose spicules that belong to *Farrea* really are, and what relation *Farrea* itself bears to *Aphrocallistes*.

Chondrilla australiensis, n. sp. (Pl. I. figs. 10–14 & 16.)

Incrusting, or self-supporting and spreading horizontally; flat, cake-shaped, lobed, of a dirty yellow or buff colour. Surface smooth, slippery, glistening. Consistence semielastic, subcartilaginous, slowly resilient in effacing impressions of the nail, tolerably tough. Vents numerous, small, of different sizes, congregated into groups here and there, or larger and single at the end of a mammiform lobe (figs. 10, *c*, & 12, *g*). Pores microscopic, linear, each in the centre of a granuliferous area having the appearance of a lobule, forming altogether a continuous uniform layer presented by the surface generally (fig. 13, *a*, *b*). Internal structure consisting of an opaque fleshy mass or body of ovoid cells, surrounded by a translucent cortical rind (fig. 12, *b*, *a*). Body-mass (fig. 12, *b*) permeated by branched systems of excretory canals (fig. 12, *b*), which respectively terminate on the surface in the vents mentioned; scantily charged with siliceous globular stellates of two kinds, most numerous towards the circumference (fig. 12, *h*). *Microscopic structure*: Surface consisting of a thin, fibrous cuticular layer, pierced by the pores in the manner above mentioned. Cortical layer translucent, consisting of a *trama* formed of fine fibres and minute granuliferous cells traversed by the pore-tubes (fig. 12, *d*). Trama (fig. 14, *a*), extending inwards, soon arrives at the opaque body of ovoid cells (figs. 12, *b*, & 14, *b*), throughout which it is continued, forming for them separate but similarly shaped cavities in close approximation (fig. 14, *b*). Ovoid cell 12 to 15-6000ths of an inch in length, filled or lined with minute cellules (fig. 14, *b*). Surface of the excretory canals, when fresh, apparently provided with the epithelial granular layer so characteristic of the Gummineæ (fig. 15)—but *here* absent, probably from defective preservation. Pore-tubes frequently increasing in size and branching before they have traversed the translucent cortical layer, to become lost in the opaque body-substance, where they appear to join the excretory canals (fig. 12, *e e*). Commencement of the excretory canals not observed. Spicules globular, siliceous, of two kinds, viz. sphæro-stellate and radio-stellate:—the former, which is the largest, consisting of a clear spheroid covered uniformly with short, sharp, smooth, conical spines arranged perpendicularly to the surface (fig. 16, *a*); and the latter consisting of several long, conical, spiniferous rays, bifid and sometimes trifid at the extremities (fig. 16, *b*). *Distribution*: Scattered indiscriminately throughout the mass (fig. 12, *h*), being most thickly congregated, as above stated, towards the surface. *Measurement*: Sphæro-stellate 6-6000ths inch in diameter; radio-

stellate 5-6000ths. Size of largest specimen about 3 inches long, 1 inch broad, and $\frac{1}{4}$ inch thick, covering a tunicated ascidian; the other specimen about $2\frac{1}{2}$ long by $2\frac{1}{4}$ broad, and the same thickness, *enclosing* the valves of an oyster.

Hab. Marine, growing over various objects and upon other sponges. Incrusting for the most part, but sometimes self-supporting, in the form of caudal or mammilliform prolongations.

Loc. Australia, Port Jackson.

Obs. The sphæro-stellate spicule (fig. 16, *a*) being identical in form with that of *Chondrilla nucula*, Sdt., I have called this species "*C. australiensis.*" In consistence, *C. nucula* (judging from Schmidt's specimens in the British Museum) appears to have been a little firmer, of a darker colour on the surface, and far more spiculiferous; but then it only possesses one, the sphæro-stellate form of spicule, while the Australian species has two. In other respects there is a great resemblance between the two species, although, probably from defective preservation, the characteristic epithelial layer of the excretory canals of the Gummineæ generally has here, for the most part, passed into dissolution.

There are two specimens in the British Museum, both from Port Jackson—one, as above stated, surrounding the deciduous valves of an oyster, and the other all but covering a large tunicated ascidian fixed to the detrital mass supporting a rough, muricated, brown specimen of *Hircinia*, which contrasts strongly in appearance with the smooth, doughy, fleshy-looking *Gummina*.

The ovoid cells in this species are fully double the size of those in *Corticium abyssi*, and filled or lined, as above stated, with minute cellulæ, whereby we may infer that the so-called granules filling the ovoid cells of *Corticium abyssi* (fig. 14, *b*) would also turn out to be cellules, if more highly magnified. There is no visible cell-wall on these cells; but its existence may be inferred from the group of cellules retaining the same ovoid form after they have been pressed out of the cavities in the trama, unless they cohere together in this form by their sarcode individually.

General Observations.

The group of sponges called by Schmidt "Halisarcinæ Gummineæ" (Atlantisch. Spongienfaun. p. 78), to which the two foregoing species belong, has been very little studied—partly, perhaps on account of the species having been overlooked among the Compound Tunicata, which are much in the same condition, and partly because they are so totally unlike the form and appearance of sponges generally.

If we were to see a tough, wet, shining lump of dough lying on a piece of sponge in our bath-room, there would be no hesitation in distinguishing the two objects; but if we were to observe something like this attached to a sponge growing on a rock in its natural habitat, the probability is that it would be a *Gummina*. Such may give some idea of the typical form of the Gummineæ.

As yet only one species has been noticed on the British coasts; and that has been designated by Johnston "*Halisarca Dujardinii*," after the illustrious naturalist who first described and gave it the name of "*Halisarca*" (ἅλιος, marine, and σὰρξ, flesh). Johnston found it in Berwick Bay, and has given the following description of it in his 'British Sponges,' published in 1842 (p. 192), together with a figure (pl. xvi. f. 8):—

"Halisarca, Dujardin.

"Character. *Substance fleshy or rather gelatinous, semi-transparent, unorganized, forming an irregular crust on the objects to which it adheres.*

"1. *H. Dujardinii* (plate xvi. fig. 8).

"*Halisarca*, Dujardin, in Ann. des Sc. Nat. n. s. x. p. 7, pl. 1. fig. 5.

"*Hab.* On the underside of stones between tide-marks, and on the stalk and roots of *Laminaria digitata*, common. Berwick Bay; Holy Island (G. J.).

"Sponge in the form of a gelatinous crust, spreading irregularly, about a line in thickness; the surface even and smooth, of a straw or ochre-yellow colour, mottled with little pale circular spots or pores, produced apparently by a deficiency of colouring-matter in their places. A few of these transparent spots are larger than the others; and if the former have any relation to the pores of the true sponges, the latter may be the analogues of the fæcal orifices.

"This production is liable to be mistaken for one of the crustaceous Compound Tunicata, or, rather, for the gelatinous spawn of the naked mollusca; but a careful inspection easily detects the difference. This exhibits no trace of any oviform bodies or cellular tissue, and contains neither crystals nor spicula, but is no other thing than a mass of irregular and granulous globules, of great minuteness, that lie imbedded in a clear jelly, covered over with a more consistent and coloured skin. Dujardin has ascertained that, when broken up, the separated masses shoot out from their sides delicate prolongations or filaments of various lengths, and slowly change their figure, in the same manner as do the detached sarcoid pieces of the freshwater sponges (see woodcut no. 9, p. 61)."

Thus commenced our knowledge of this family.

In 1859 (Archiv f. Anat.) Lieberkühn seems to have published (for I have not the means of referring to his papers here) observations on *Halisarca Dujardinii* made in Heligoland; and to him we are indebted, according to Schmidt, for having more accurately identified this organism with the true sponges (Die Spong. adriat. Meeres, p. 79, 1862).

Finally, Schmidt, in a former part of the same publication (p. 36 *et seq.*), established a family for this and similar species by the name of "GUMMINEÆ," under which are included the following four genera and six species, viz. :—1. Gummina: *G. gliricauda*, *G. ecaudata*. 2. Chondrilla: *C. nucula*, *C. embolophora*. 3. Cellulophana: *C. pileata*. 4. Corticium: *C. candelabrum*. And further on, at p. 79, under HALISARCA, Dujardin, *H. lobularis*. In his first "Supplement" to this publication (p. 41, 1864) was added another species of the latter, viz. :—*Halisarca guttula*. Then follow new species which he received among other sponges from the coast of Algiers (Die Spong. der Küste von Algier. p. 1, 1868), viz. :—*Chondrosia*, Nardo: *C. reniformis*, Nardo; and *C. plebeja*, Sdt. Finally those mentioned in his 'Atlantisch. Spongienfauna,' p. 25, 1870, viz. *Cellulophana collectrix*, Columnitis, n. gen., *C. squamata*, and *Chondrilla phylodes*,—making altogether 7 genera and 13 species, to which adding *Halisarca Dujardinii*, a species described and figured by Dr. Emil Selenka under the name of "*Lacinia*" (Zeitsch. f. wissenschaft. Zool. B. vi. S. 568, Taf. xxxv. figs. 8–10), and the two species above described gives a total of 17 species.

Although Selenka claims for his species (which is from Bass's Straits in Australia, cake-shaped, and about 2 inches long by 1 thick) a new genus, on account of the sphæro-stellate spicule with which it is charged being *calcareous* and not siliceous, it seems to me to require further elucidation; for, in the first place, the sphæro-stellates, in material and form, appear to be almost identical with those which abound in many species of Compound Tunicata not unlike *Lacinia* in general form, and, in the second place, the anatomical details do not satisfactorily show that the species is similarly composed to the class of sponges under consideration. The genus is called "*Lacinia*," and the species *L. stellifica*.

While Schmidt gives excellent figures of the general form and spicules of his species, Kölliker, in his 'Feinere Bau der Protozoen,' gives the best illustrations of the softer parts.

I have not been able to get beyond what Kölliker has here figured and stated, simply because, like Kölliker, my observations have been confined to specimens preserved in spirit; nor

have I become aware until just now that I had such an important group of sponges to study; while, as I cannot help thinking that there must be more species than *Halisarca Dujardinii* to be found on our coasts, so I hope to meet with not only this but other species of the family here in a living state, through which I may, by experiment, be able to add something more satisfactory to our knowledge of their intimate structure than we at present possess.

Aided by Schmidt's figures and descriptions of the last species, which he has published (Atlantisch. Spongienfaun. *l.c.*), I now plainly see, from mounted specimens, that the incrusting cartilaginous sponge which I found associated with the specimens of *Polytrema* on a crab-claw kindly given to me by Dr. Carpenter, and noticed in the Annals (vol. v. p. 392, 1870), charged with minute stellates and long, pin-like spicules, bearing a "close alliance to *Tethya lyncurium*," is as closely allied to the incrusting species of *Gummina* called by Schmidt *Columnitis squamata*, described and figured in the Atlantish. Spongienfaun. &c. (p. 25, Taf. v. figs. 3 & 4); while the figured section of this *Gummina*, in spicules and structure, is almost identical with a vertical section of the circumference of *Tethya* (*Donatia*) *lyncurium*. In short, both species are but repent forms of *Donatia*, which, although for the most part (but not always) assuming a globular form, is, in the structure of its cartilaginous circumference and spicules, more nearly allied to the species of Gummineæ just noticed than to any other form of sponges yet described. Then, too, we cannot help seeing the intimate relation which subsists between these sponges and the Suberites, *e.g. Cliona celata*, var., *Raphyrus Griffithsii*, Bk., &c.; and thus the value of Schmidt's grouping *Donatia* (*Tethya*) *lyncurium* and the latter sponges &c. under the heading "Suberitidinæ" (Atlant. Spongienfaun. &c. p. 79) becomes apparent.

In this category will also have to come several specimens in the British Museum when I have time to illustrate and describe them, the species (indicated by their spicules) which appear in Dr. Bowerbank's illustrations of the Hexactinellid sponges mentioned, and no doubt many others which will sooner or later come to notice—all showing that this will one day form a very large and important group among the Spongiadæ.

With reference to my statement (Annals, 1872, vol. x. p. 47) that Schmidt's *Halisarca guttula* appeared to me to be a compound tunicate animal and "no sponge at all," I would add that later examination of the Gummineæ shows me that such an assertion has yet to be proved. Undoubtedly, when the calcareous sphæro-stellates are dissolved out of some incrusting species of Compound Tunicata, the embryos of the latter have

very much the appearance of what is seen in *Halisarca guttula*, and if arrested in this stage of development would be almost identical; but when the cell-mass of the embryo is "told off" into the organs which they are to assume in the fully developed Ascidian, then, of course, the difference at once becomes obvious.

Still there may be lower forms of the Compound Tunicata which permanently remain in the embryo state of the higher ones; and this I propose to myself to determine when time and opportunity enable me to hunt for them among the rocks of the sea-shore in this locality.

All are liable to shortcomings, and Schmidt among the rest, although he is certainly, at present, much beyond all others in actual knowledge of this family; still I could have wished that he had not compared the fibrillæ of the Gummineæ (Die Spong. adriat. Meeres, p. 37, 1862) to the fibrillæ of Lieberkühn's Filifera, since the said fibrillæ upon which this family of sponges has been built are nothing but a parasite, which I have not only found in different sponges from all quarters of the globe, but especially pervading a species of *Reniera* like Schmidt's *R. fibulata* (Die Spong. des adriat. Meeres, p. 73, pl. vii. f. 9), viz. bearing smooth, fusiform, slightly curved acerates and small bihamates, which is equally cosmopolite.

In my arrangement of the sponges in the British Museum I have had to expunge the family of "Filifera" in name (*Polytherses*, Duchas. et Michelot.) altogether, and for the algal parasite itself on which the family was erroneously founded by Lieberkühn have proposed the name of "*Spongiophaga communis*" (Annals, 1871, vol. viii. p. 330).

If called upon for a practical definition of the Gummineæ, I should say that they are like a piece of yellowish dough in appearance. Incrusting, lobed. Tough, semielastic, subcartilaginous. Slippery, smooth. Consisting of a cortical and medullary or body portion: the former translucent and narrow; the latter opaque, bulky, and massive. The former covered by a thin fibrous cuticle, uniformly pierced by pores and presenting here and there oscula singly or in groups. Composed of a kind of *trama* formed of fine fibres and minute granuliferous cells, which trama extends throughout the body-mass and affords cavities for the ovoid cells respectively of which the body is composed. The cortex traversed perpendicularly by the pore-tubes continued from the pores inwards to unite with the branches of the excretory canals, which, in their turn, traverse the body-mass in tree-like forms to terminate respectively in the oscula mentioned. Abundance of siliceous

spicules (in Selenka's species calcareous), of different forms according with the species, or none at all as in the Halisarcinæ; but in no instance a fibrous skeleton, like that of sponges in general; indeed no skeleton at all, which is the chief distinguishing point between the Gummineæ and true sponges.

About the specimen dredged up on board the 'Porcupine' are:—besides the well-known *Coccoliths*, a great number of that species first described and figured by Schmidt as "*Rhabdolithes*" (Annals, 1872, vol. x. p. 359, pl. xvii.), for which I would propose the name of *R. Schmidtii*, after its well-known discoverer (Pl. I. fig. 17); also a number of *calcareous* spherical cells lined with minute cellulæ, for which I would propose provisionally the name of *Sphæolithes abyssi* (fig. 18), as they may perhaps hereafter, be found to be embryos of the *Globigerinæ* or some other deep-sea foraminifer. They are, however, very numerous and of all sizes below the largest, which is that figured.

The fragments and spicules of the other sponges about this specimen, viz. *Dictyocylindrus abyssi*, n. sp. (Pl. I. fig. 2, *e*), *Desmacella annexa*, Sdt. (Florida) (fig. 2, *e*), *Reniera fibulata*, Sdt. (fig. 1, *e*), and *Cliona abyssi*, n. sp. (fig. 1, *d*), will be described and figured on a future occasion.

EXPLANATION OF PLATE I.

Fig. 1. Portion of *Lophohelia prolifera*, imbedded in *Corticium abyssi*, n. sp., dredged up on board H.M.S. 'Porcupine' in the "chops" of the English Channel; depth 500 fathoms, muddy bottom. Natural size. *a*, *Lophohelia*; *b*, *Corticium abyssi*; *c*, vents of the same; *d*, fenestral openings of *Cliona abyssi*, n. sp., in *Lophohelia*; *e*, portion of *Reniera fibulata*, Sdt.; *f*, fragments of large spicules imbedded in the *Corticium*.

Fig. 2. The same, opposite side, nat. size: *a*, *Lophohelia prolifera*; *b*, *Corticium abyssi*; *c*, vents of the same; *d*, portions of a *Farrea* which grew on the *Lophohelia* before the whole became imbedded in the *Corticium*; *e*, portions of *Dictyocylindrus* (Bk.) *abyssi*, Cart., n. sp., and *Desmacella annexa*, Sdt., filling and surrounding the tube net of *Farrea*; *f*, portion of *Corticium* filling tube net of *Farrea*; *g*, fragment of large spicule imbedded in *Corticium*; *h*, fragment of *Reniera fibulata*, Sdt.

Fig. 3. *Corticium abyssi*, biternate spicule of, lateral view.

Fig. 4. The same, average largest size of biternate spicule: *a*, portion of shaft supporting the cuticula; *b*, arms broken off; *c*, inner portion of shaft; *d*, central canal. Scale 1-12th to 1-6000th of an inch.

Fig. 5. The same, vertical view of head of biternate spicule: *a*, main arms, not spined; *b*, secondary arms, spined. Same scale.

Fig. 6. The same, young form of biternate spicule, spineless: *a*, central inflation.

Fig. 7. The same, birotulate with four recurved arms, about 1-5000th of an inch long. Scale 1-12th to 1-6000th of an inch.

Fig. 8. The same, portion of body-substance: *a*, ovoid cells, and *b*, biro-

tulates, relatively magnified. Scale 1-48th to 1-6000th of an inch.

Fig. 9. The same, pore surrounded by ovoid cells, seen through the cuticula: *a*, ovoid cells; *b*, epithelial cells lining the pore. Scale 1-24th to 1-6000th of an inch.

Fig. 10. *Chondrilla australiensis*, n. sp., small specimen attached to a piece of oyster-shell: *a*, *Chondrilla*; *b*, oyster-shell; *c*, vent: magnified 2 diameters.

Fig. 11. The same, vertical section, nat. size.

Fig. 12. The same, vertical section (No. 11) magnified 8 diameters: *a*, cortical translucent rind; *b*, body-substance, opaque; *c*, oyster-shell; *d*, pore-tubes passing down vertically through rind; *e*, pore-tubes, enlarged, branching and apparently opening direct into excretory canal-system; *f*, excretory canal-system, segmented in the section; *g*, vent, or single termination of the same; *h*, sphæro-stellate and radio-stellate spicules imbedded in the cortex. The spicules, though really existing throughout the mass, are generally not inserted, for the sake of perspicuity, any more than the ovoid cells and opaque structure of the body-mass.

Fig. 13. The same, portion of the surface, showing pore-openings, vertical view: *a*, pore; *b*, surrounding granules. Scale 1-48th to 1-6000th of an inch.

Fig. 14. The same, portion of the body-substance, showing:—*a*, trama, consisting of fine fibrillæ or filaments and minute granuliferous cellulæ; *b*, ovoid cells lined with cellulæ, situated in ovoid cavities of the trama; *c*, sphæro-stellate spicules. All relatively magnified; scale 1-48th to 1-6000th of an inch. (Compare with fig. 8, on the same scale, to show that the cells of *Corticium* are only half the size of those of *Chondrilla*.)

Fig. 15. *Corticium abyssi*, diagram of fragment of excretory canal-system, to show characteristic epithelial-cell lining: *a*, vent; *b*, "fragment." (In *Chondrilla australiensis* this cell lining is not present, probably from defective preservation.)

Fig. 16. *Chondrilla australiensis*, spicules of: *a*, sphæro-stellate; *b*, radio-stellate. Scale 1-12th to 1-6000th of an inch.

Fig. 17. *Rhabdolithes Schmidtii*, Cart. Scale 1-12th to 1-6000th of an inch. (See Schmidt's figures and description, 'Annals,' 1872, vol. x. p. 359, pl. xvii.)

Fig. 18. *Sphærolithes abyssi*, n. sp., Cart., average largest size. Same scale. (The double line is a deception here; it should merely signify the outer boundary of the layer of cellules, in fact the capsule which is perfectly spherical.)

III.—*A Catalogue of the Neuropterous Insects of New Zealand; with Notes, and Descriptions of new Forms.* By Robert M'Lachlan, F.L.S.

It has been represented to me that the entomologists of New Zealand are greatly in need of classified lists of the insects of that colony, and that any contribution in this way would be welcome. Acting upon this suggestion, I have drawn up a catalogue of the New-Zealand Neuroptera (in the Linnean